NASA SBIR/STTR Technologies

Environmentally Durable C/SiC Turbomachinery Structures

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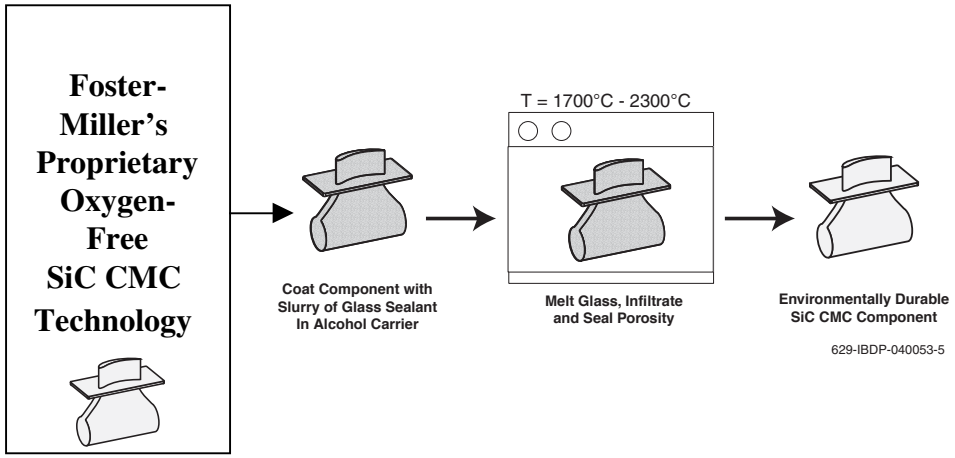
Identification and Significance of Innovation

- PIP based CMCs are needed for turbomachinery but do not have adequate environmental durability because of inherent 10 to 20% interconnected porosity
- Foster-Miller will infiltrate and seal this porosity with high temperature glass that will not reduce temperature resistance
- Capillarity based infiltration process is low cost, short, and suitable for components of realistic shape and size
- Oxide infiltrant provides excellent environmental durability



Capillarity Based Infiltration/Sealing of CMC Porosity with Oxide Melt

Technical Objectives and Work Plan

- To prove that the interconnected porosity can be infiltrated and sealed with oxide glass/ceramic material
- To show improvement in environmental durability at 1500°C in air and in H_2 rich steam

Work plan includes analyses and key fabrication/test tasks:

- Select fiber, interface coating and SiC matrix precursor
- Produce SiC CMC specimens via PIP processing
- Select glass infiltrant and process
- Infiltrate PIP densified CMC specimens and determine improvement in environmental durability
- Conduct feasibility assessment

NASA and Non-NASA Applications

- Rocket propulsion structures such as turbine blades, nozzle ramp, thrust chamber, etc.
- Space optical bench and mirror components
- Turbine engine components such as turbine blades and stator vanes, combustion chamber
- Industrial, tribological applications – aircraft brakes, pump vanes, textile guides

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